Gateway

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The ARRL Packet-Radio Newsletter

PS-186 PROJECT STATUS (10/18/87)

What is it?

The PS-186 is a four-port packet switch designed for high speed operation (greater than 1 Mbit/s). It is described in detail in WB6HHV-KA6IQA-N6NKF's paper in the ARRL 6th Computer Networking Conference Proceedings. The goal of the present prototype phase is to build eleven PS-186 boards, and deliver them (at no cost) to software developers.

Status:

We were relieved that the six-layer printed circuit boards arrived from our board manufacturer in Taiwan on August 26, three days prior to the ARRL Computer Networking Conference. We built serial number 1 hastily and brought it to the conference untested. We had ordered 12 boards, but the board house only delivered 11, so it looks like there will be a total of 11 prototype boards.

On September 16, serial number 1 completely passed the diagnostic program while executing out of PROM with an emulator attached. On September 17, we tried the same using a CMOS 80C186 processor installed on the board (ie, without the emulator), and passed diagnostics again. The present diagnostic (a 48-page listing) tests all the basic functions and tests the serial ports three ways: polling, interrupt-driven and DMA (direct memory access, a technique where sequential I/O operations are carried out by hardware in order to reduce processor load), including four-port full-duplex concurrent DMA.

So far, the board has only two cuts and jumps. Two pins were exchanged on one IC.

Seven PS-186 PC-boards are now built. Five are tested and working. The last four worked on the first try -- without even a single bad IC. (It takes about four hours to stuff and solder a PS-186 board manually.)

There are more things to test, of course. We want to build up a board containing all-CMOS parts and make sure that works. We have an official Intel 16-MHz CMOS sample on order and hope to build up a board running the PS-186 at 16 MHz with all peripherals running at 8 MHz and try that out, too. It appears that if a board is stuffed with all "AS" type TTL parts in the address/data path, a 16-MHz processor should be able to run 0-wait states with 100-ns RAMs. We've got 85-ns RAM samples on order just in case. The prototypes will ship with 8-MHz CPUs because that is what we have!

Two daughter boards have been designed: an RS-232 interface and a TAPR-style TTL modem-disconnect (with hardware TXDELAY, TXTailDelay, etc). The RS-232 board has been prototyped and tested and pc boards are now being fabricated. The TAPR-style interface is not yet into pc-board layout. One RS-232 daughter board hopefully will be shipped with each PS-186 prototype.

Tom Lafleur, KA6IQA, has done a lot of work on the debugger in the last few weeks with help from Mike Brock, WB6HHV, and Paul Williamson, KB5MU. It is essential that the debugger be shipped with the first boards because it provides the means for loading code into the PS-186. Most of the software developers don't have in-circuit emulators.

All in all, it looks like we're close to meeting our promised schedule of delivering the prototypes in October. Discussions continue with organizations who may distribute production versions of the PS-186, but there are no announcements yet in this area.

from Franklin Antonio, N6NKF,
via CompuServe's HamNet

NEW PACKET RADIO SOFTWARE

C BBS VERSION 4.0

Version 4.0 of the "C BBS" by Hank Oredson, WØRLI, and David Toth, VE3GYQ, has recently been released. This latest version of the classic PBBS software written in C for IBM PC/XT/AT computers is available from the usual sources.

IBM TERMINAL PROGRAM FOR THE AEA PK-87, PK-232 AND HEATH HK-232

A new version of Packet, a terminal program for the AEA PK-87, AEA PK-232 and Heath HK-232 TNCs written by Lynn Taylor, WB6UUT, is now available for IBM PC/XT/AT, PS/2 and compatible computers. It includes the following features:

o Easy multiple-connection operation by dividing the terminal into 10 "virtual terminals" with each connection shown on it's own "virtual screen."

o Each virtual screen is displayed on the physical screen one at a time. When you switch from one virtual screen to another, the screen is restored to it's previous appearance. You may also scroll back to the beginning of the QSO on that screen.

o There is an additional virtual screen for monitoring that functions the same way as the 10 connection virtual screens.

o Outgoing text is displayed in a different color than incoming text and status information is provided on-screen.

o A unique binary transfer protocol is also available.

o Sets of TNC parameters may be selected to automatically configure the TNC upon start-up and another set upon shut-down. These can be used to set up the TNC for VHF or HF operation, change the CTEXT message, etc.

o Allows you to copy/paste from/to any channel, to disk or to the printer.

o Fixes minor bugs that existed in previous versions of the program.

from Lynn Taylor, WB6UUT

UPDATE ON TAPR/AMSAT JOINT DIGITAL SIGNAL PROCESSING PROJECT

The TAPR/AMSAT DSP (digital signal processing) project is moving forward very rapidly with many interesting developments.

First, the software. Previously, one of the things mentioned was that we would like to have a program that takes PSK and turns it into FSK that a TNC 2 can read. This was accomplished in a program running on a TMS32010 DSP microprocessor or "DSP engine." Every time the program sees a binary 1, it outputs a 1200-Hz tone. and every time the program demodulates a PSK binary 0, it outputs a 2200-Hz tone. Given that, we run this on JAS-1 signals or the PSK produced from the TAPR PSK modem; using this technique, we can decode the packets on an unmodified TNC. I completed the code and tested it on the JAS-1 PSK downlink with success. We do not have provision at this time for controlling the frequency of the receiver with the board, but that could be added with some trouble in the future.

The DSP project is picking up new folks every day. Ten boards were ordered in the first round and it looks like the second round will have to be in the 10 to 15 board range. David Langmann, owner of Delanco Spry, says delivery of the first batch will occur before the third week of October. Approximately 50 official enquiries have been received by Tom Clark, W3IWI, and I and twelve folks have written $525 checks for the boards. Some of the enquiries come from people who have the board already, so the total number is higher than those ordered in this first run of boards.

As a guest of the Central Iowa Technical Society, I gave a DSP demonstration at the Midwest ARRL Convention and it was very well received. Many new folks and old friends showed up and signed up as interested in the project. Demonstrated were the spectrum analyzer code that W3IWI and I have worked on for some time. Voice digitization and processing were also demonstrated and the diversity of possible filters done in software were also shown. Thanks for the hospitality!

On the future DSP hardware, the folks in Tucson, under the able leadership of Lyle Johnson, WA7GXD, along with Dan Morrison, KV7B, Eric Gustafson, N7CL, and Chuck Green, NØADI, have been roughing out ideas for a future DSP board for ham radio. Heated bits have been flying back and forth on CompuServe's HamNet and work towards a DSP engine designed for ham radio needs is rapidly converging. With W3IWI and I saying what we would like in the way of processor capability and the group there including some very able DSPs working on the practical implementation of all these competing interests, we are about to converge on a design. It appears that unless the earth shakes New Jersey, Maryland and Tucson, we will have a TMS320C25 DSP microprocessor running at 20 MHz with a 40-MHz option for those who can afford the very expensive memory or cannot afford to do without the speed. A host processor on the board, probably of the iApx86 family, will handle communications between your host computer and the DSP chip. This will allow folks who do not have IBM PCs or compatibles to also participate in the fruits of the DSP labor. It will slow down the transfer of data between the host and DSP chip, but will open the array of DSP tools to folks using VIC 20s to Sun 3s.

The applications being worked on are TNC 3s, RTTY, AMTOR demodulators, telephone modems, spectrum analyzers, SSTV demodulators, FAX demodulators (including WEFAX APT) and others that I am forgetting to mention. The number of jobs this engine can perform, which will fit in a box not unlike a TNC 2's enclosure, are limited only by the number of hours in a day that the people working on the project can afford to put into it. When higher speed parts are included and a very fast connection is made to your computer (via a SCSI port or something similar), it is hard to envision many special purpose devices that we currently use in a signal processing way in our shack that will not be replaced by this device. Again, the many things this will replace will be done by simply changing the software running in the DSP chip and its host processor.

This project is getting more exciting every day. Be sure to stay tuned for further developments!

(For further reading, see the papers on digital signal processing written by N4HY and W3IWI for the ARRL Amateur Radio 6th Computer Networking Conference, and The World Above 50 MHz, QST, December 1987.)

from Dr. Bob McGwier, N4HY,
via Packet Status Register

TO IMPROVE THE FLOW

This comment is directed to all SYSOPs of PBBSs and regards mail forwarding to PBBSs outside their local or immediate metropolitan areas. Because so many new PBBSs spring up all over the country and others die off the vine so rapidly, the usual "lists" of PBBSs are generally out of date by the time they circulate through the networks. Many times my PBBS receives mail addressed to some PBBS of which I have no knowledge, which does not appear in my existing forwarding files or routing tables, does not appear on the "network lists" and sometimes is not immediately visible or obvious to me during routine system housekeeping. The system

does not know what to do with that mail and, thus, it sits for days, unattended and wasted. There is a visible need for more direct, more effective communication between SYSOPs to the point where each SYSOP assumes a responsibility to attach a brief service message to the neighboring SYSOP who is going to receive the new mail, indicating some minimum reference data as to the city/state in which the target PBBS is located. This could be done easily in the message title or subject line, even though the originator has put something else there. A brief note such as "(to CA)" or perhaps "(to NTSXXX)" or even "(to ZIP 96xxx)"... any clue as to where the target PBBS is located. Then it is a relatively simple matter for the serving system operator to make a quick patch to his forwarding files and ensure prompt handling of the traffic. At least the serving SYSOP will know there's something in the system that "needs attention". I hope you can help spread this information around the system operator community and help us improve our efficiency.

from Norm Sternberg, W2JUP

THE COST OF NETWORKING

Part of the problem of our grand schemes to incorporate packet radio into a formal, third party traffic system (NTS?) is the almighty dollars required to get things set up. KE3Z recently described some of the technical problems with NET/ROM operating on the same frequency as users and alluded to the cost of networking.

Hams have not had to think about the cost of the "transport layer." They buy or build a rig and the transport layer is the ionosphere. But, in packet radio we have to have a network with which to connect things together. I have just recently installed a "simple" 220-MHz NET/ROM digipeater, so have some idea of what it takes. It runs 1200-baud AFSK-FM with a Clegg FM-76, a 100-watt amplifier, MFJ-1270 TNC with NET/ROM and a four-bay collinear Cushcraft antenna. It is at a site formerly used for a 147-MHz voice repeater, so the hardline was "free." Total cost was $850. To upgrade it with a GLB or AEA 19.2-kbaud "RF-modem" and a 2-meter access port would make it about $2,500 to $2,800.

There are 14 to 18 of these digipeaters planned for Ohio. They will not do much except forward mail and somewhat unreliably as we are relying on old transceivers. The cost of the "low-end" network will be another $12,000 or more, the high-end, $30,000 or more. PBBSs cost about the same as a medium- to high-end digipeater.

So, we will have about $30,000 to $60,000 of "community property" tied up in Ohio including PBBSs. (Note that I am calling this "community property" even though most of the PBBSs and digipeaters are privately owned. Since we need to rely on them, we should figure in the cost.) Figuring that Ohio is typical - it will cost about $1.5 to $3 million to get set up in the United States.

We have a large number of packet-radio operators. If half of the known packet-radio operators would chip in $20 per year to the networking cause, it would cause no blip at all in their individual ham budgets, but would create lots of "seed money" to get networking off the ground. These things do not come cheap.

Tabulation of NET/ROM Digipeater Costs:

	Low-End*	Medium	High-End**
RF Transceiver	$100	$400	$700
100-watt Amp	270	270	270
Power Supply	100	100	200
TNC & NET/ROM	160	160	260
Antenna 80	150	300	
Feedline	10	100	100
High-speed Mods	-	-	200
Access Port	-	-	770
Total	$720	$1180	$2800

* Based on actual investment.

** Based on 19.2-kbaud "RF modem" by AEA or GLB and one access digipeater on an LAN frequency. Assume that some modifications will have to be made to the TNC and amplifier to get them to run at 19.2 kbaud.

from Hank Greeb, N8XX

KILL TRAFFIC: ANOTHER OPINION

It was good to see letters from WA7MAD and KA1T regarding the KT (kill traffic) command used by WØRLI PBBSs (Gateway, Volume 4, Number 3). Here's my viewpoint:

I have had messages not delivered through NTS, through packet radio, through the telephone and by word of mouth. One of the things that does not appear to be part of regular NTS checking is that of reliability. While it is the specified duty of anyone accepting traffic to insure that it is forwarded or delivered (or to message the originator that it cannot be), there does not appear to be cross-checks in place to actually test how reliable the system is.

The KT command does allow for some checking to take place, but I think it is not the most effective answer. There is no justification for automatic service messages being generated for each piece of traffic removed from a PBBS, as there is no justification for a rule requiring a service message be sent for each message delivered to the addressee. We don't need packet radio junk mail.

As packet radio technology developed over the past few years, it was useful to have the KT command to make the new packet radio user comfortable with the new technology --- as KA1T says, "to build confidence in the system." That confidence has been built and it is time to move ahead. What is needed now is a way for the originator of the message to find out what has happened to it when he/she wants to know. This is similar to the currently used handling instructions used in NTS, such as HXC --- report date and time of delivery to originating station.

Why not make the service message an option? If the message is entered with the standard ST command, no service message should be generated. Add a new option like SS or a parameter in the ST command to request a service message like ST K1CE

@ W1AW/SVC. Those who write the software can come up with a reasonable way to do it once the idea is agreed upon by the NTS community. Note that currently the packet radio service message is sent to the station that entered the message into the packet radio automatic message forwarding system, not necessarily to the message originator. Both of them may wish to receive a service message saying it was taken from the packet radio system for delivery.

Additionally, why not think a little more broadly? I send a lot of non-NTS packet radio messages to people using the S command. I would sure like to be able to get a service message indicating that my message had been received by the addressee. The "return receipt" option should be there for any message, not just those in NTS format.

from Tom Frenaye, K1KI,
ARRL Director, New England Division

GATEWAY CONTRIBUTIONS

Submissions for publication in Gateway are welcome. You may submit material via the U.S. mail to:

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or electronically, via CompuServe to user ID 70645,247. Via telephone, your editor can be reached at 203-879-1348 on evenings and weekends, and he can switch a modem on line to receive text at 300, 1200, or 2400 bauds.

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